
**Tools for pressing — Ball-lock
punches —**

Part 2:
Ball-lock punches for heavy duty

Outillage de presse — Poinçons à bille —

Partie 2: Poinçons à bille pour tôles épaisses

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Contents

Page

Foreword.....	iv
1 Scope	1
2 Normative references	1
3 Terms and definitions.....	1
4 Dimensions.....	1
4.1 Basic dimensions — Ball in locking position	1
4.2 Perforating punches	3
4.3 Pilots — Types C and D.....	6
4.4 Punches with ejector	7
5 Material and hardness	10
6 Designation	10
Bibliography	11

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 10071-2 was prepared by Technical Committee ISO/TC 29, *Small tools*, Subcommittee SC 8, *Tools for pressing and moulding*.

This first edition of ISO 10071-2, together with ISO 10071-1:2001, cancels and replaces ISO 10071:1991, of which it constitutes a technical revision.

ISO 10071 consists of the following parts, under the general title *Tools for pressing — Ball-lock punches*:

- *Part 1: Ball-lock punches for light duty*
- *Part 2: Ball-lock punches for heavy duty*

Tools for pressing — Ball-lock punches —

Part 2: Ball-lock punches for heavy duty

1 Scope

This part of ISO 10071 specifies interchangeability dimensions and tolerances, in millimetres, for ball-lock punches for heavy duty.

It is applicable to ball-lock punches with shank diameter sizes from 10 mm up to including 40 mm, in round, square, rectangular and oblong shapes, for punching holes in steel sheets or other materials the thickness of which is less than 8 mm.

This part of ISO 10071 also gives examples related to materials and hardness, and specifies the designation of ball-lock punches for heavy duty.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 2768-1:1989, *General tolerances — Part 1: Tolerances for linear and angular dimensions without individual tolerance indications*

ISO 8695:1987, *Tools for pressing — Punches — Nomenclature and terminology*

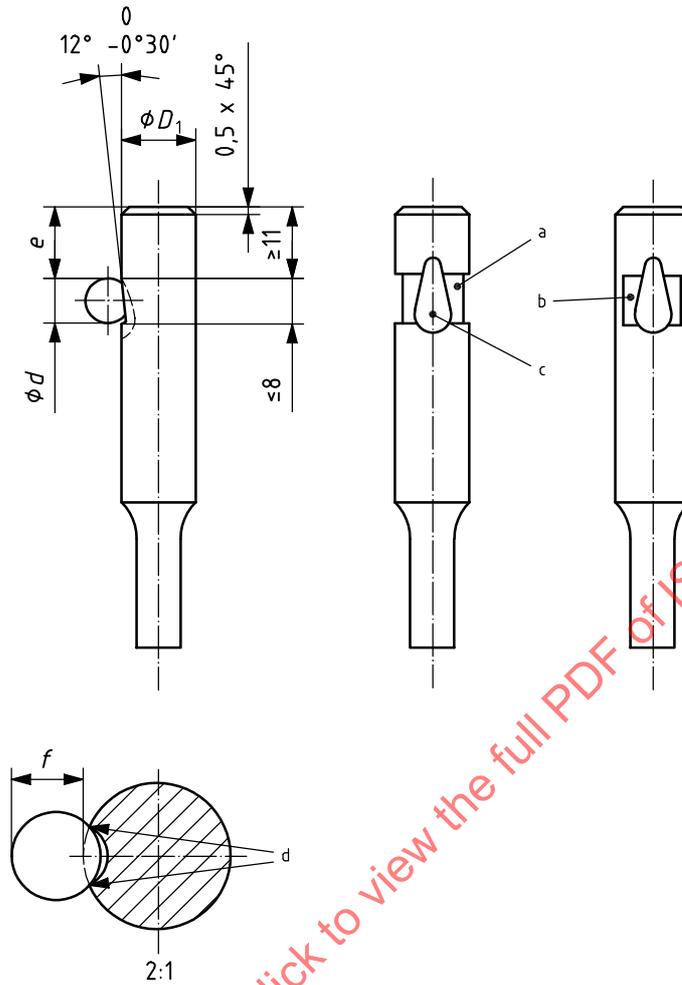
3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 8695 apply.

4 Dimensions

4.1 Basic dimensions — Ball in locking position

See Figure 1 and Table 1.



- a Ball seat relief: type and dimensions at manufacturer's discretion.
- b Alternative ball seat relief types (band type, swipe type).
- c Ball seat.
- d Two-point contact.

Figure 1

Table 1

D_1	Ball diameter d	e	f
g5		+0,2 0	0 -0,1
10	10	11,4	8,6
13	12	12,3	10,2
16	12	12,3	10,2
20	12	12,3	10,2
25	12	12,3	10,2
32	12	12,3	10,2
40	12	12,3	10,2

4.2 Perforating punches

4.2.1 Punches with straight shank — Type A

See Figure 2 and Table 2.

General tolerance: ISO 2768-m
Surface roughness value in micrometres

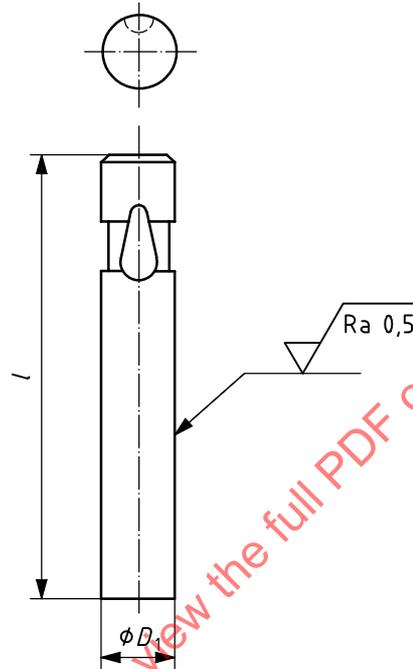


Figure 2

Table 2

D_1 g5	l + 0,5 0				
	80	90	100	110	125
10	x	x	x	x	x
13	x	x	x	x	x
16	x	x	x	x	x
20	x	x	x	x	x
25	x	x	x	x	x
32	x	x	x	x	x
40	x	x	x	x	x

NOTE See 4.1 for the dimension of the ball and dimensions and tolerances of the ball seat.

4.2.2 Punches with reduced shank

4.2.2.1 Punches with round shape — Type B

See Figure 3 and Table 3.

General tolerance: ISO 2768-m
Surface roughness value in micrometres

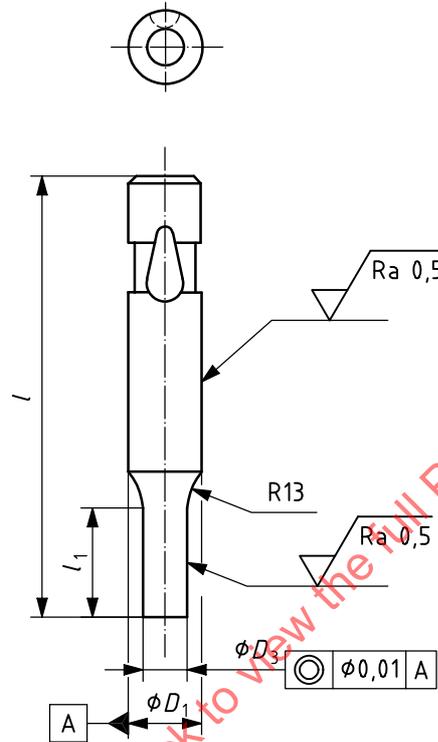


Figure 3

Table 3

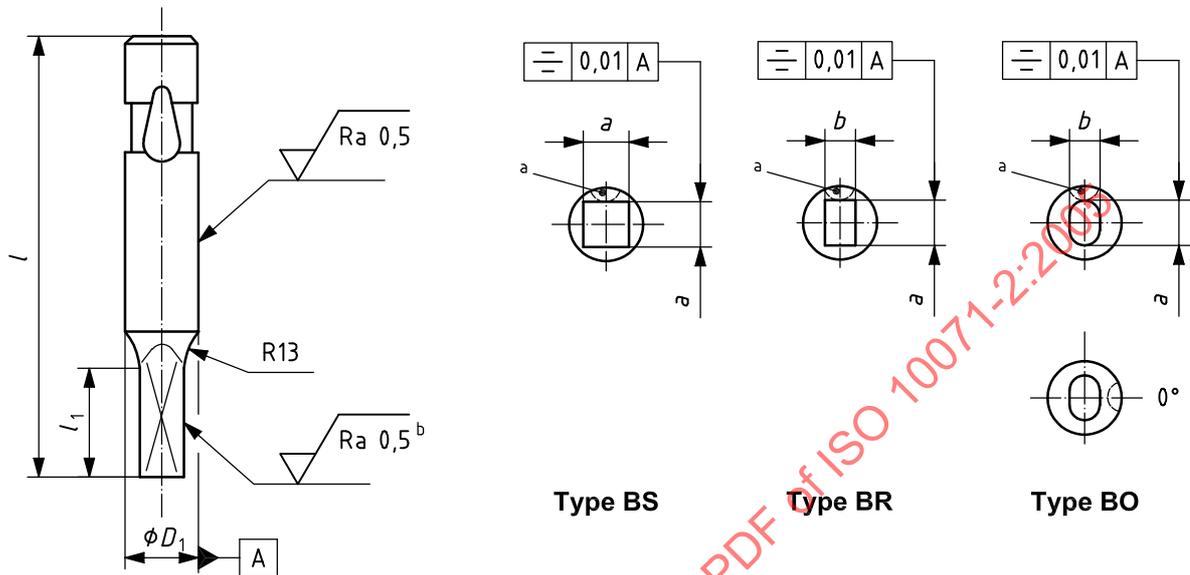
D_1 g5	D_3 $\pm 0,01$	l $+0,5$ 0			
		80	90	100	110
10	$2,1 \leq D_3 \leq 9,9$	x	x	x	x
13	$5 \leq D_3 \leq 12,9$	x	x	x	x
16	$8 \leq D_3 \leq 15,9$	x	x	x	x
20	$12 \leq D_3 \leq 19,9$	x	x	x	x
25	$16 \leq D_3 \leq 24,9$	x	x	x	x
32	$24 \leq D_3 \leq 31,9$	x	x	x	x
40	$30 \leq D_3 \leq 39,9$	x	x	x	x

NOTE The point length, l_1 , is left to the manufacturer's discretion. See 4.1 for the dimension of the ball and dimensions and tolerances of the ball seat.

4.2.2.2 Punches with square (S), rectangular (R) and oblong (O) shapes — Types BS, BR and BO

See Figure 4 and Table 4.

General tolerance: ISO 2768-m
Surface roughness value in micrometres



- a Standard at 90°.
- b On all work faces of the point.

Figure 4

Table 4

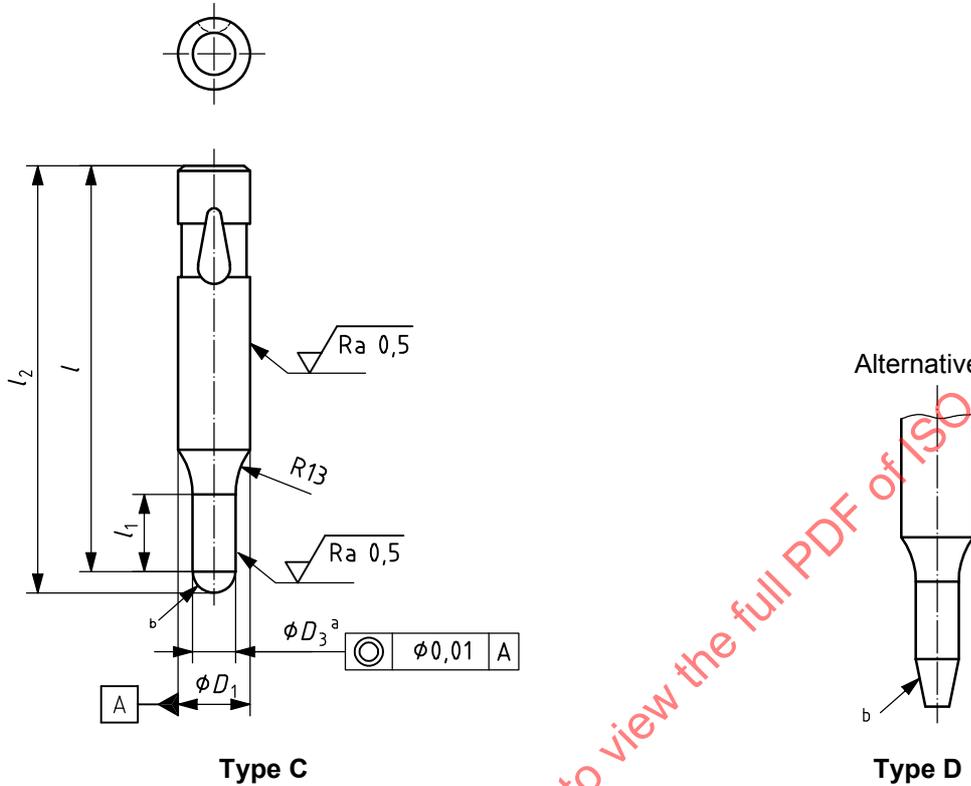
D_1 g5	Type BS a $\pm 0,01$	Types BR and BO a and b $\pm 0,01$	l $+0,5$ 0			
			80	90	100	110
10	$2,1 \leq a \leq 7$	$2,1 \leq (a, b) \leq 9,9$	×	×	×	×
13	$4,5 \leq a \leq 9,1$	$4,5 \leq (a, b) \leq 12,9$	×	×	×	×
16	$6 \leq a \leq 11,2$	$6 \leq (a, b) \leq 15,9$	×	×	×	×
20	$8 \leq a \leq 14,1$	$8 \leq (a, b) \leq 19,9$	×	×	×	×
25	$10 \leq a \leq 17,6$	$10 \leq (a, b) \leq 24,9$	×	×	×	×
32	$12,5 \leq a \leq 22,5$	$12,5 \leq (a, b) \leq 31,9$	×	×	×	×
40	$14 \leq a \leq 28,2$	$14 \leq (a, b) \leq 39,9$	×	×	×	×

NOTE The point length, l_1 , is left to the manufacturer's discretion. See 4.1 for the dimension of the ball and dimensions and tolerances of the ball seat.

4.3 Pilots — Types C and D

See Figure 5 and Table 5.

General tolerance: ISO 2768-m
Surface roughness value in micrometres



- a The diameter, D_3 , of the pilot shall be smaller than the diameter of the equivalent punch.
- b The shape is left to the manufacturer's discretion.

Figure 5

Table 5

D_1 g5	D_3 $\pm 0,01$	l_2 max.			
		90	100	110	125
		l $+0,5$ 0			
		80	90	100	110
10	$2,1 \leq D_3 \leq 9,9$	x	x	x	x
13	$5 \leq D_3 \leq 12,9$	x	x	x	x
16	$8 \leq D_3 \leq 15,9$	x	x	x	x
20	$12 \leq D_3 \leq 19,9$	x	x	x	x
25	$16 \leq D_3 \leq 24,9$	x	x	x	x
32	$24 \leq D_3 \leq 31,9$	x	x	x	x
40	$30 \leq D_3 \leq 39,9$	x	x	x	x

NOTE The point length, l_1 , is left to the manufacturer's discretion. See 4.1 for the dimension of the ball and dimensions and tolerances of the ball seat.

4.4 Punches with ejector

4.4.1 Punches with ejector with straight shank — Type E

See Figure 6 and Table 6.

General tolerance: ISO 2768-m
Surface roughness value in micrometres

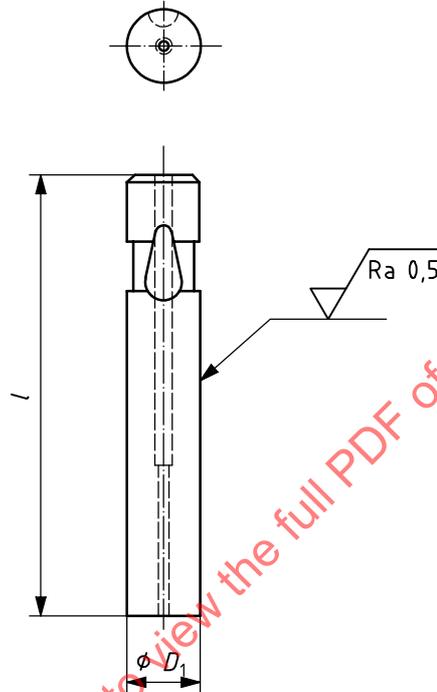


Figure 6

Table 6

D_1 g5	l +0,5 0			
	80	90	100	110
10	x	x	x	x
13	x	x	x	x
16	x	x	x	x
20	x	x	x	x
25	x	x	x	x
32	x	x	x	x
40	x	x	x	x

NOTE The ejector components and the locking hole are left to the manufacturer's discretion. See 4.1 for the dimension of the ball and dimensions and tolerances of the ball seat.

4.4.2 Punches with ejector with reduced shank

4.4.2.1 Punches with ejector with round shape — Type F

See Figure 7 and Table 7.

General tolerance: ISO 2768-m
Surface roughness value in micrometres

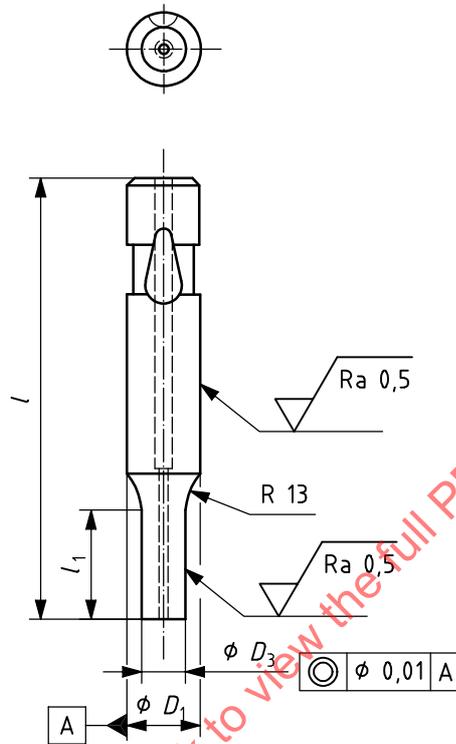


Figure 7

Table 7

D_1 g5	D_3 $\pm 0,01$	l $+0,5$ 0			
		80	90	100	110
10	$2,1 \leq D_3 \leq 9,9$	x	x	x	x
13	$5 \leq D_3 \leq 12,9$	x	x	x	x
16	$8 \leq D_3 \leq 15,9$	x	x	x	x
20	$12 \leq D_3 \leq 19,9$	x	x	x	x
25	$16 \leq D_3 \leq 24,9$	x	x	x	x
32	$24 \leq D_3 \leq 31,9$	x	x	x	x
40	$30 \leq D_3 \leq 39,9$	x	x	x	x

NOTE The point length, l_1 , the ejector components and the locking hole are left to the manufacturer's discretion. See 4.1 for the dimension of the ball and dimensions and tolerances of the ball seat.